

ing the Bay of Bengal at Portonovo. Enquiries with the local fishermen revealed that large turtles with carapace length of more than 45 cm were common at Coleroon 15 to 20 years back.

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V. KALAIARASAN

R. KANAKASABAI

November 9, 1991 B. RATHINASABAPATHY

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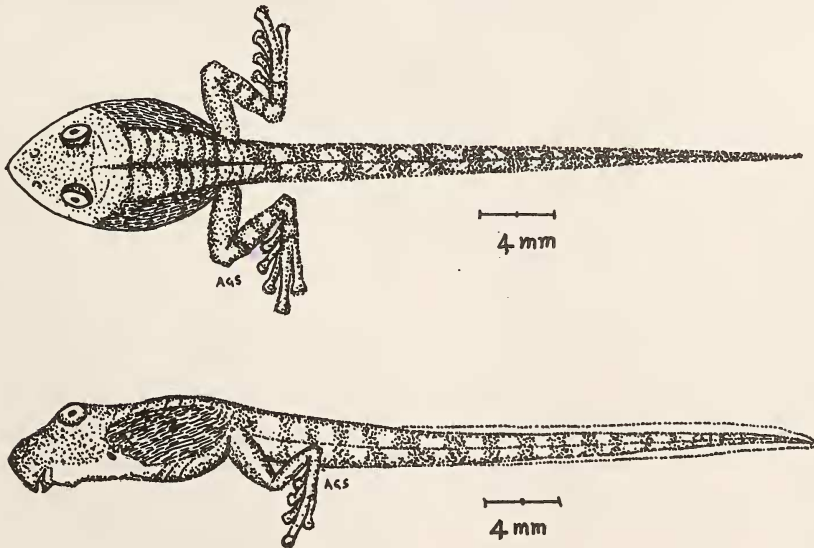
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27. MORPHOMETRY, HABITAT, BEHAVIOUR AND FOOD OF THE TADPOLES OF LEITH'S FROG *RANA LEITHII*

(With three text-figures)

Leith's frog *Rana leithii* is distributed along the Western Ghats from Surat Dangs, south Gujarat in the north through Suriamal (Thane district), Khandala (Poona district), and the Karla caves to Panchgani in Satara district, Maharashtra, southward to Gersoppa in North Kanara, Karnataka (Abdulali and Daniel 1954, Chari and Daniel 1952, Daniel and Shull 1963). This frog is not uncommon in short grass and in ditches on hillsides and appears to be diurnal, at least during the rains (McCann 1932). The species

is abundant in Matheran (a hill station 100 km away from Bombay) the type locality. The tadpole was described by Chari and Daniel (1952), but morphometric information is meagre. To study the morphometry of the tadpoles of this species in detail and to observe the habitat of adults and tadpoles, a collection trip was made to Matheran at the end of August 1991. Tadpoles were collected from the rock cuttings on the way to Matheran during the day and adults were collected at night.



Figs. 1-2. Tadpole of *Rana leithii*. 1. Dorsal view, 2. Lateral view.

Morphometry: The body of the tadpoles is oval, wider than high and flattened dorso-ventrally (Figs. 1, 2). The average body length in 20 tadpoles was 11.16 ± 0.68 mm (Table 1) and the average tail length was 29.40 ± 1.75 mm. The tail is more than two and a half times as long as the body. Tail muscle was almost squarish near the vent and tapers to a fine point. The tail fins are vestigial. Dorsally the fin is seen as a ridge to half of the tail and broadens out slightly towards the end; whereas ventrally the tail has a groove in the middle which runs from the base of the tail till halfway to the tip, then forms a ridge which broadens out. From the main groove several minute grooves branch out.

Head slopes downwards, with bluntly pointed snout; nostril dorso-lateral, nearer to the eye than to the tip of snout. Eyes dorsal; interocular width greater than the internasal space. Spiraculum sinistral, inconspicuous, directed upward and backward, situated almost equidistant from snout and vent. Vent tubular and situated ventrally in median line, at the junction of tail with the hindlimb. In preserved specimens, a pair of small prominent grooves starting from behind the eye and meeting centrally with the median dorsal groove, run up to the base of the dorsal fin. The sides of the median groove have a ribbed appearance. Skin laterally rugose.

Mouth ventral with papillae on the sides of the upper and lower lip and on the edge of the

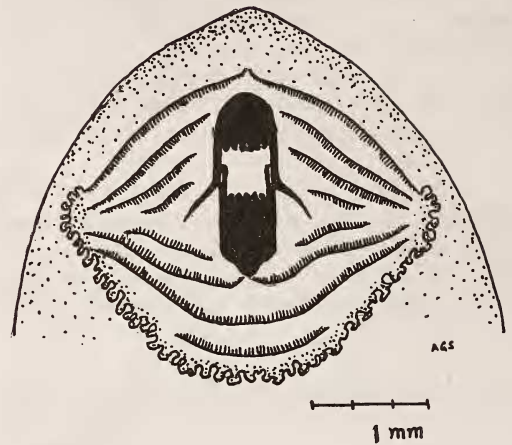


Fig. 3. Mouth of *Rana leithii* tadpole.

lower lip. The edge of the upper lip is without papillae. Teeth rows have the formula $0: 4 + 4/2 + 2 : 2$ (Fig. 3). The first row, though apparently undivided, is divided at the centre. The beak is oval in shape, the mandibles horny and black, with strongly serrated edges.

The body colour varies from uniform slaty to pale brown. Tail muscle and hindlimbs are pale brown and barred. The ventral side is dirty white.

Habitat: The tadpoles were collected from rock cuttings with gentle flow of water, having

TABLE 1
MEASUREMENTS OF 20 TADPOLES OF *Rana leithii* AT HINDLIMB STAGE

Measurements (mm)	Range (mm)	Mean (mm)	S.D. \pm	Ratio of measurements to body length (%)
Body length	10.15-13.00	11.16	0.68	—
Body height	3.40-4.65	3.88	0.37	34.76
Body width	5.20-7.20	6.14	0.43	55.01
Head height	3.00-4.50	3.40	0.32	30.46
Head width	5.00-6.50	5.70	0.42	51.07
Internasal space	1.90-2.50	2.21	0.17	19.80
Diameter of eye	1.50-2.10	1.72	0.16	15.41
Interocular width	3.40-4.60	4.14	0.23	37.09
Mouth width	2.70-3.20	2.96	0.13	26.52
Snout to spiraculum	5.70-7.10	6.25	0.32	56.00
Tail length	27.00-33.30	29.40	1.75	263.44
Tail height	1.90-2.40	2.04	0.12	18.27
Diameter of tail muscle	1.50-2.20	1.81	0.15	16.21
Length of hindlimb	11.60-18.35	13.55	1.66	121.41

algal growth. As Chari and Daniel (1952) stated, the colouration of the tadpoles matches well with the colour of the slaty rock — with the rocks covered with brown algae, it is very difficult to distinguish them. Adults were collected from the ground (amidst short grasses, in leaf litter and ditches, between and near railway tracks, on mud-paths) as well as from tree trunks up to one metre above the ground. Adults were not observed around the tadpoles' habitat and were collected far from the tadpoles' habitat. Abdulali (1954) had observed large numbers of adults on the wet rock cuttings by the railway tracks and on wet rocks in flowing streams (tadpoles were absent from the stream itself). Though McCann (1932) and Abdulali and Daniel (1954) reported that this species was diurnal, I collected several specimens in the monsoon at night.

Behaviour: The tadpoles lack a tail fin, and are therefore less adept swimmers. They are adapted to life on wet rocks rather than in ponds or streams. The strong, black, serrated beak helps in nibbling the algal growth on wet rocks. Tadpoles

were very active and agile, jumping onto the slippery surfaces when they were disturbed. They do not show any holding organs to cling on to wet, slippery rocks. Tadpoles in forelimb stage seem more active. I approached a group of tadpoles (most of which had forelimbs), and my slight movement made all the tadpoles jump to the bottom of the rocks from a height of 2 m. Some fell into the water running along the rocks. In the water they submerged to the bottom quietly and after for a few minutes came out of the water and climbed slowly on to their earlier location on the rock.

Food: The stomach contents revealed that the tadpoles had eaten large quantities of various species of diatoms (*Pinnularia*, *Navicula*, *Synedra*, *Cymbella* etc.) and a few species of filamentous algae.

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A.G. SEKAR

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28. CANNIBALISM IN BUTTERFLY LARVAE

Cannibalism in butterfly larvae is reported by Moore (1912) and Deithier (1937). In Danianae it was first described by Field (1893), who recorded larvae of monarch butterfly attacking each other in captivity. Later Urquhart (1960) confirmed this observation and reported that larvae, besides attacking each other, also ate eggs. He further confirmed the observations of Balduf (1939) and Sweetman (1958) that cannibalistic behaviour in *Danaus* is abnormal and occurs under artificially crowded conditions in the laboratory. Brower (1960) conducted experiments on egg cannibalism in the monarch and queen butterflies *Danaus plexippus* and *D. gilippus*. This note deals with our observations *in vivo* and *in vitro* conditions. In July 1991 we were rearing common tiger *Danaus (Saltura) genutia* on the food plant *Ceropegia*

aculeata collected from BNHS land at Goregaon, Bombay. While collecting fresh leaves of the food plant for the captive larvae, we observed that a leaf was eaten on the edge. On turning it over we found a second instar larva busy eating an egg. This induced us to investigate further.

We collected a few leaves, each having a single egg on its underside, for further observations. When these leaves were placed in glass bottles already having a second instar larva in each, we found that after wandering for a while, the host larva started denting the egg and shortly thereafter continued nibbling at it, consuming its contents in less than five seconds.

Later we saw that a third instar larva on coming in contact with the egg first dented the egg and after moving about on the leaf around the egg,